NWS GIS/Google News

Fall 2010 Issue
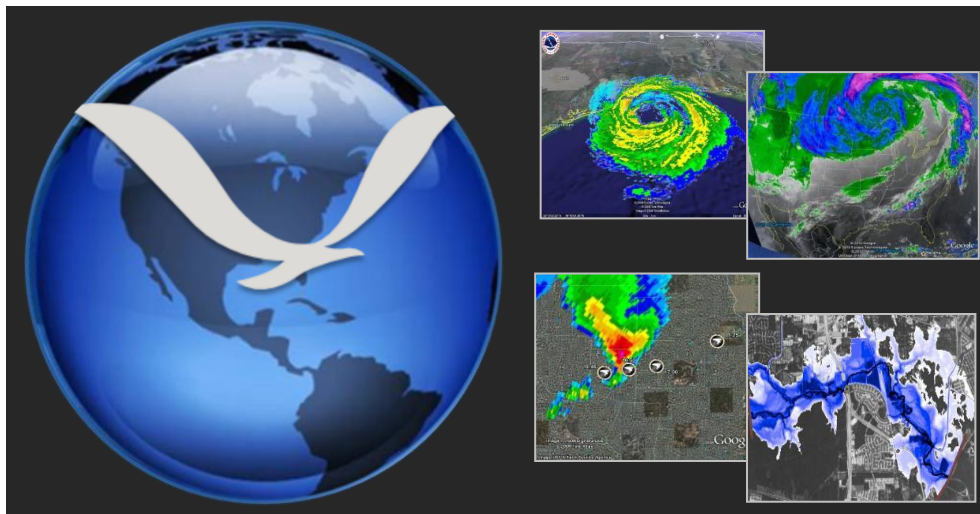
Your source for sharing GIS & Google news, projects, and activities in the National Weather Service

Message from the Editor

Welcome to the Fall 2010 edition of our newsletter! We continue to request project submissions and/or information on GIS outreach opportunities in which you have taken part. We would like to promote these projects and activities to showcase what your office/agency has accomplished.

Sharing of this information will also help increase our agency's knowledge base and allow us to leverage our GIS tools to their fullest potential! Therefore, I encourage you to email your project and/or outreach submissions to the editor (darrin.hansing@noaa.gov) for inclusion in our biannual newsletter.

~ Thank you

Geographic Information Systems

New ESRI ArcGIS Version 10

ArcGIS 10 has been released by ESRI and most NWS offices will soon be receiving this update via a push installation procedure. With this release come many new and updated features that will allow users to more effectively produce and provide GIS maps and services. One new and exciting benefit is the capability to "check out" ArcGIS licenses outside of the NWS network (i.e. home, conferences, hotels, etc).

From August through November, ESRI has been offering free seminars across the U.S. to promote this new release. If you were unable to attend one of them, don't worry. An overview of the presentation materials can be found here... http://www.esri.com/events/seminars/arcgis10/materials/index.html.

ESRI also is offering some free training to better familiarize you with some of the new tools and functionality of this latest version. This training is available at... http://training.esri.com/gateway/index.cfm?fa=search.results&searchterm=arcgis10.

Some of the benefits of this new version include...
- Increased productivity tools
- More powerful Spatial Analysis
- Improved Access to Imagery
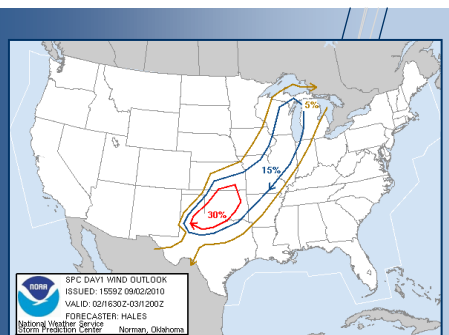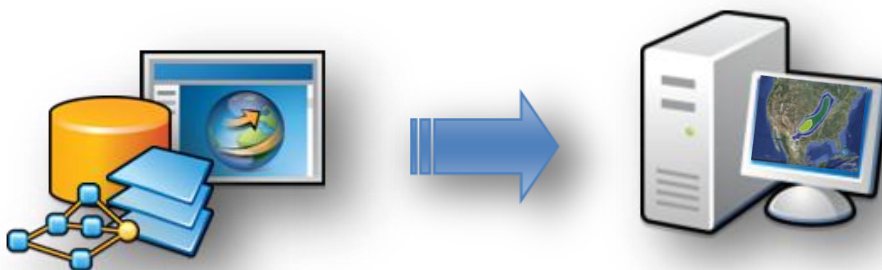- New Ways to Share Data...and more!

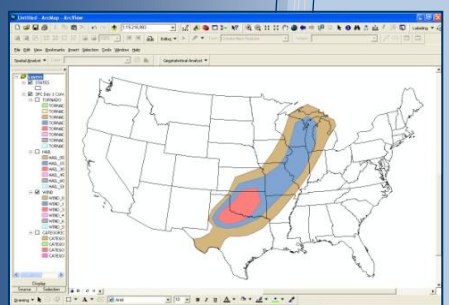**Figure 1:** SPC Day 1 Convective Outlook (Wind) from the Storm

**Figure 2:** SPC Day 1 Convective Outlook Shapefile displayed in ESRI ArcMap.

Figure 3: SPC Day 1 Convective Outlook KML file displayed in Google Earth.

SPC Convective & Fire Weather Outlooks: Available in Shapefile and KMZ Format
By: Matthew Duplantis & Nicholas Fillo – Shreveport, LA

The National Weather Service Forecast Office in Shreveport, LA is pleased to announce that the Storm Prediction Center's (SPC) Convective Outlook and Fire Weather Outlook graphics are now available for download in both shapefile and KML formats. These products can be found on the Shreveport WFO website at http://www.srh.noaa.gov/shv/?n=outlooks.

Development of these products was the result of requests from multiple organizations for the ability to import SPC Convective/Fire Weather Outlooks into their GIS or virtual globe displays. The capability to incorporate these overlays on top of their own data layers is a necessity for operational decision making.

Matthew Duplantis, ITO for the WFO in Shreveport, developed a script in the Perl programming language to create these products. This script parses through the outlook areal outlines, converting the latitude and longitude coordinates into vertices and populates the data into shapefiles and KML files. Nicholas Fillo, forecaster and GIS focal point at WFO Shreveport, formatted and projected the data so that the files would properly display in GIS (i.e. ESRI ArcMap) and Virtual Globe software (i.e. Google Earth).

The creation of these products allows the National Weather Service to continue its mission of providing meteorological decision support to its partners. These new products can be used to aid in planning on a wide scale, ranging from large multi-organization missions, such as the Gulf Oil Spill, to smaller localized missions, such as construction projects or fire-fighting efforts. For questions or comments, please contact Matthew Duplantis (matthew.duplantis@noaa.gov) or Nicholas Fillo (nicholas.fillo@noaa.gov).

There is a high likelihood that these products will soon become available on the Storm Prediction Center"s website at http://www.spc.noaa.gov/. SPC is working with the Shreveport WFO on the methodologies used to produce these enhanced products.

Utilizing ArcMap Template to Create "On-The-Fly" Maps
By: Nathan Foster – Louisville, KY

ArcMap is a cumbersome program with a steep learning curve, but with the use of templates, much of the workload can be diminished. A template can be created and used for peak heat indices, wind gusts, forecasted snowfall, or whatever meteorological phenomena you wish to help your users better visualize. A template can be created fairly easily using one of the predesigned ESRI templates already available in ArcMap. When ArcMap first opens, use the Template button instead of a New Empty Map, then click on one of the tabs to retrieve a design.

You can alter the design, including the color scheme, to suit your needs. A proper map should include a legend with evenly divided classes, a scale bar, an inset, the source, the NWS logo, an easily understandable title, and any limitations to your product.
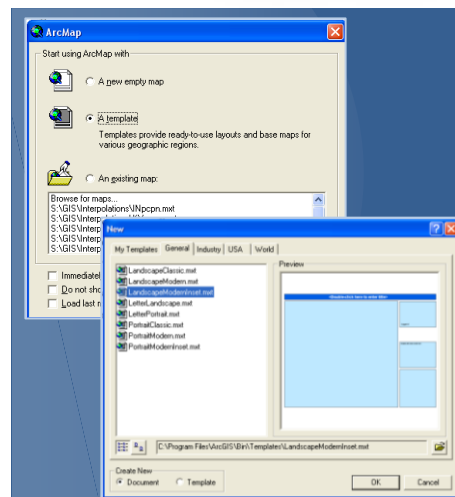
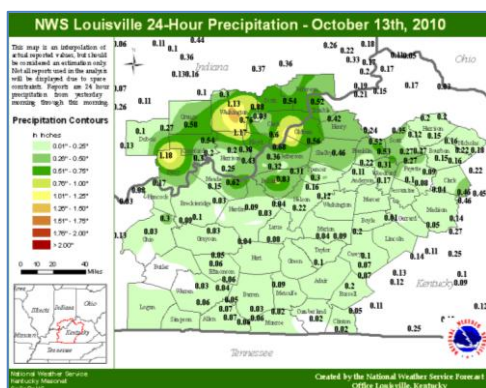The Graphic (Figure 1) below is a good example of this type of map design.

Figure 1: ArcGIS map of 24 hour

Figure 2: ArcGIS map of SPC storm damage reports

Once you finish your design, you can recycle it for other maps. For example, the map above was designed for precipitation amounts. However, it has also been used with SPCs storm damage reports layer (Figure 2). For the storm reports map, you simply remove the precipitation layer, add SPCs shapefile, and change the color scheme. Then just save it as a different mxt file.

When you're designing your template, you will need a layer of all possible observation points so that when you're ready to do your map, you can quickly fill in the numbers and delete the stations that are not available that day. Figure 3 is an example of peak heat indices. A shapefile is used which contains all the locations where the heat index values are reported. This could be done with wind chill, 24 hour temperature change, etc.

By keeping these templates on hand, you can quickly recall them, edit them to the day's event, and then easily generate an updated map, ready for your users. For more information, contact Nathan Foster (nathan.foster@noaa.gov).
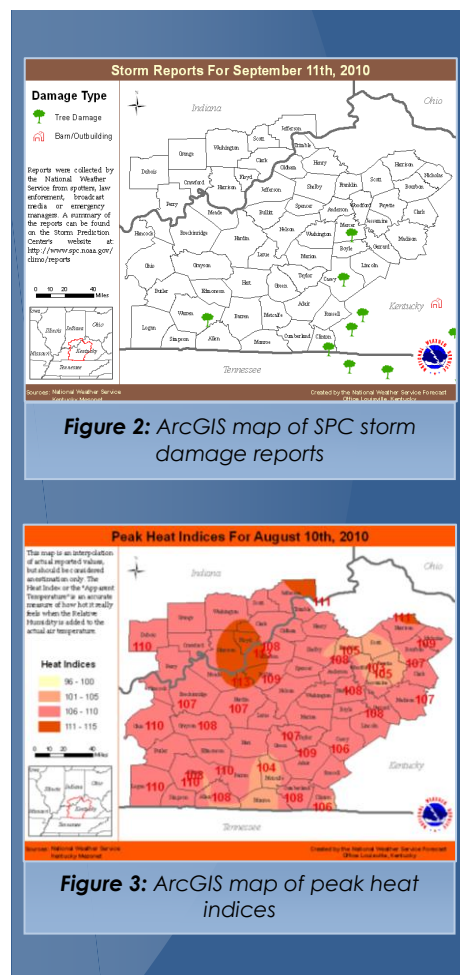

Figure 3: ArcGIS map of peak heat indices

Figure 1: Map of monthly rainfall totals (September 2009)

Rainfall Mapping Across the Western Carolinas and Northeast Georgia
By: Blair Holloway – Greenville-Spartanburg, SC

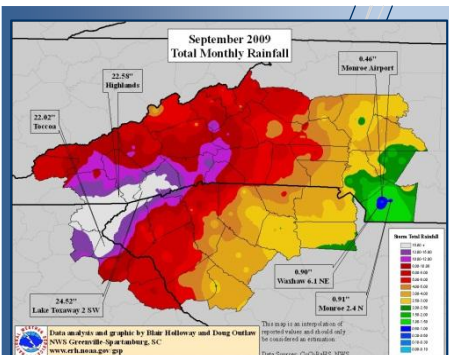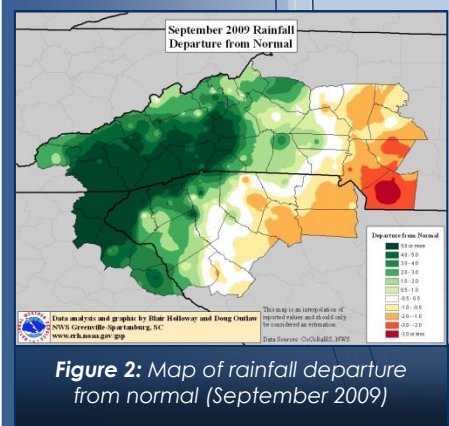Each month, rainfall totals across the Greenville-Spartanburg, SC (GSP) County Warning Area (CWA) are mapped using ArcGIS. These rainfall totals are compiled using a variety of sources including ASOS, Cooperative Observers, and CoCoRaHS volunteers for all the counties within the CWA as well as a one county buffer around the CWA boundary. After these data are gathered, they are imported into ArcMap as point features then interpolated to raster data using the Inverse Distance Weighted tool within the Spatial Analyst extension. The resulting raster graphic is a color-filled and contoured image of rainfall across the entire CWA for the given month.

The monthly rainfall analysis is furthered through a comparison to the current climatological normal (1971-2000) to generate a monthly departure from normal. Data from 1971-2000 were collected for each month at all ASOS and cooperative observer sites that had complete records, and mapped through the process described above. Then for each month, using the raster calculator, the observed rainfall was compared to the climatological normal to create a departure from normal.

Currently, these maps reside on the Greenville-Spartanburg WFO webpage (http://www.erh.noaa.gov/gsp/hydro/past_conditions.htm) and go back to January 2009. This date is approximately the time when the CoCoRaHS program expanded to include all three states within the GSP CWA, greatly extending the areal coverage of rainfall observations across the region. Similar mapping has been done on an annual basis (2009) and will continue for each subsequent year.

Figure 2: Map of rainfall departure from normal (September 2009)

Using GIS in Research – "Tornadoes Impacting Interstates: Services and Societal Considerations"
By: Scott Blair and Elizabeth Konop-Lunde – WFO Topeka, KS

For this research, we utilized GIS in support of quality-controlling and plotting an Interstate tornado database. These data helped shed some light on the vulnerability of highway motorists.

First, we created an Interstate base map, with a North American Datum of 1983 projection, from a USGS National Atlas Interstate shapefile. All roadways on the Interstate base map were quality controlled for accurate placement using 2009 DeLorme Street Atlas software. Then, the beginning and ending points of each tornado from 1990-2008 were downloaded, plotted, and connected in a straight line in Environmental Systems Research Institute ArcMap 9.2 software.

A query of tornado paths was conducted to catalog all tornadoes within 5 mi of either side of an Interstate. This buffer mitigated tornado coordinate estimates or rounding inaccuracies found within Storm Data. Further QC measures followed.

The use of GIS software allowed us to easily identify the information with each tornado trace and determine whether it should be included into the database. Figure 2 taken from our paper shows the entire Interstate tornado database plotted in GIS. This study served as the first quantitative review of tornadoes impacting motorists traveling along the Interstate System in the central and southeast United States. We'd encourage anyone interested to check it out in the Electronic Journal of Severe Storms Meteorology (EJSSM) available at: http://www.ejssm.org/ojs/index.php/ejssm/article/view/64/57. Questions on this research or methodologies that were used can be directed to Scott Blair (scott.blair@noaa.gov).

Figure 1: An EF4 tornado crosses Interstate 70 near Quinter, KS, on 23 May 2008. (Photo by Bill Hark)

Figure 2: Study domain with tornado paths (red lines) crossing one or more Interstates (blue lines) from 1990 to 2008.

## An Overview of the First Annual Geospatial PDF Workgroup Meeting
By: Phil Herndon – NOAA NOS OCIO IT – Silver Spring, MD

Ray Caputo of the U.S. Army Geospatial Center (AGC) organized the first work group meeting at the Renaissance Hotel in D.C. to hold discussions of use of geo-enabled PDF maps by the federal government. Although not a complete list, representatives from USDA, USGS, NOAA, US Army, USAF, US Navy, Secret Service, Library of Congress, US Forest Service, NGA, SAIC, CACI and In-Q-Tel attended.

After the welcoming remarks and introductions were completed, Mr. Caputo began the sessions by clarifying the difference between a GeoPDF® and a Geospatial PDF as geo-enabled products:

- A Geospatial PDF refers to an Adobe-created document supported by many vendors (i.e. ESRI's GIS software) and has limited simple GIS utility such as reading imported coordinates.

- GeoPDF® refers to a registered, trademarked software product of TerraGo. The GeoPDF® software is a specialized Geospatial PDF production tool with a toolbar for advanced functions and data viewing. Adobe Reader (version 9 & higher) may read a basic geospatial PDF map, but for a GeoPDF® one must download (free) a special add-on to view the GeoPDF® in its full capacity.

Figure 1: *Example of where NOAA could utilize GeoPDF capabilities*
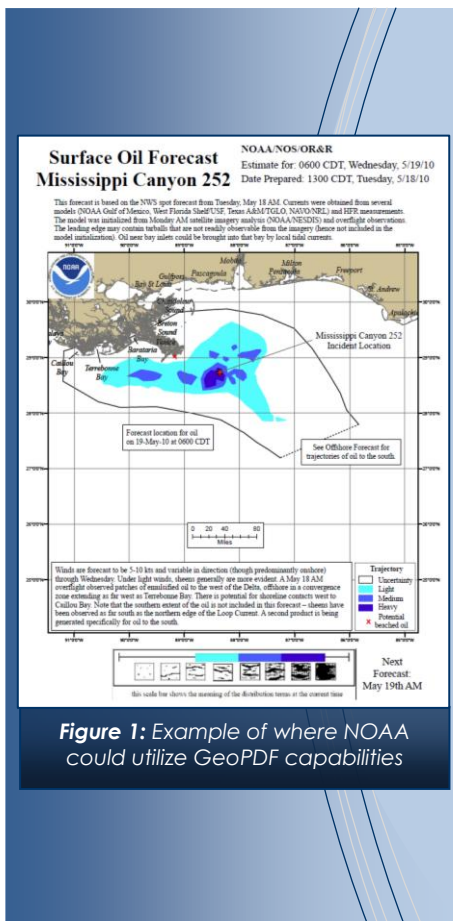
Capabilities of GeoPDF ® above those of the basic Geospatial PDF include:

- Handling of multiple coordinate displays
- Configured for 400+ datums & 40+ projections
- Captures coordinates and compares with Google Maps
- Provides ability to measure area and length
- GPS tracking
- Ability to import / export other supported documents (i.e. csv, XML, KML/KMZ, shp /shm files)
- Usability with Windows Mobile 6 & 7 compatible devices

The TerraGo software is compatible with ESRI ArcGIS and is able to produce GeoPDFs ® of relatively small file size. These geo-enabled PDFs handle Vector, Raster and Hybrid data with added 3D capability. This would allow for seamless fly-through viewing of a LiDAR-derived map, for example.

Mr. Caputo explained that these advanced functionalities and the effective organization of layer and attribute information are why the Army chose to spend a bit more money on this GeoPDF ® software. Having the ability to configure and simplify the pdf map output is a real benefit for customers with little GIS experience.

The NGA Resource Center, the NGA CADRG Team, USGS and Navy facility provided examples of using geo-enabled PDFs.

My analysis of using GeoPDF® is this. It can greatly enhance a static map product by making it more interactive with underlying data layer attributes. It is simple, and one does not need to be a geographer or GIS expert to start up, read and manipulate it. Such an electronic map becomes more of a snapshot report of activity in GIS-lite format. A recent example of where the capabilities of this software could have been a real benefit was with the ERMA "Oil Spill Forecast Maps".

Flash Flood Risk Analysis Project
By: Andy Foster – WFO Springfield, MO

Flash floods pose a serious threat to life and property in the Ozarks. Flood prone areas including hundreds of low water crossings dot the landscape. To locate and understand flood risk areas, NWS Springfield developed the Flash Flood Risk Analysis Project (FFRAP).

A primary goal of FFRAP is to enhance flash flood warning decisions resulting in more timely, accurate and detailed flash flood warnings. Geographic Information Systems (GIS) play an integral role in this project.

GIS has proven to be a valuable tool in analyzing flood prone areas to better understand stream and basin response, and the ultimate impact to a specific location and population.

ESRI's ArcMap has been utilized to plot known flash flood prone locations including low water crossings. Furthermore analysis of flood frequency and assigning risk factors for a given low water crossing and basin has been performed using ArcMap's spatial analyst tool extension. To date, nearly 1500 low water crossings have been plotted.

Local storm reports were imported into ArcMap to first assess the frequency of flash floods at a given low water crossing and associated basin. Identifying these flood hot spots can be very useful in anticipating flash floods and issuing timely flash flood warnings.

To further highlight flood prone locations, ArcMap was used to assign a risk factor to a given low water crossing by analyzing flood frequency, fatalities, water rescues and population density. These low water crossings were integrated into
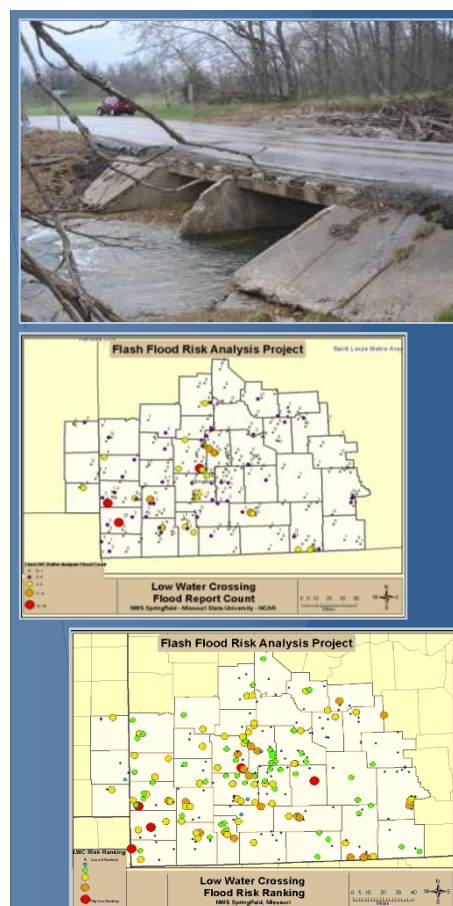
AWIPS Warngen. Flash flood warnings issued by NWS Springfield contain a list of low water crossings located within the warning polygon in order of their risk factor.

Additional development and analysis will continue to enhance flash flood detection including incorporating data into the Flash Flood Monitoring System (FFMP) to assess the flash flood threat for a given stream or basin.

Utilizing GIS to effectively interrogate this complex data set will support successful flash flood warning operations, flood mitigation activities, and effective response and recovery planning. This information can be found on the Springfield WFO website at...http://www.crh.noaa.gov/sgf/?n=ffrap_lwc. For more information on this project please contact Andy Foster (andy.foster@noaa.gov).
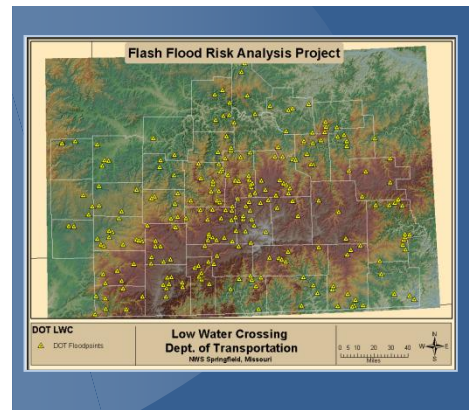
WFO Nashville Hosts Geographic Information Systems Summit

Geographic Information Systems (GIS) users from National Weather Service Southern and Central Region Weather Forecast Offices (WFO) gathered recently at the Nashville office for a GIS summit.

Organized by Nashville Information Technology Officer Michael Davis and Louisville Hydro Meteorological Technician Nathan Foster, the two-day summit was designed to allow for sharing of GIS-related activities and techniques underway at each of the participating offices.

Integrating hardware, software and datasets; GIS allows users to capture, manage and display various forms of geographically-based information. GIS provides information in easily understood formats that illustrate relationships, patterns and trends. Utilizing local or global maps, charts and reports; GIS specialists can show locations, quantities, concentrations and how various elements come together and interrelate.

The summit was also used as the launching point to create a Southern Region GIS Team. Little Rock forecast office Meteorologists Tabitha and Sean Clarke and Robert "BJ" Simpson have recently been tasked to organize a team.

"For years, I have witnessed Southern Region spearhead mission-applicable GIS work, including our own office with the COOP GIS effort developed by the Clarkes," said Renee Fair, meteorologist-in-charge of the Little Rock office. "With the recent addition of Simpson, we have reached a tipping point with GIS expertise. So I challenged my staff to organize a Southern Region GIS Team."
The Little Rock COOP GIS assists in the maintenance of the office's cooperative observer program by displaying attributes associated with efficient program management -- such as site visitation information.

The team will facilitate communication, projects and activities contributed by GIS users from all across Southern Region. It will be modeled on the successful structure and experience of a Central Region GIS Team created several years ago.

(Pictured Left to Right):
Nathan Foster, WFO Louisville, KY;
Charles Gant, WFO Memphis, TN;
Gary Goggins, WFO Birmingham, AL;
Eric Holweg, WFO Morristown, TN;
Michael Davis, WFO Nashville, TN;
Shawn O'Neill, WFO Morristown, TN;
Jack Settelmaier, Southern Region Headquarters;
Nicholas Fillo, WFO Shreveport, LA;
Tabitha Clarke, WFO Little Rock, AK;
Tony Edwards, WFO Jackson, KY;
Buddy Whorrall, WFO Jackson, KY;
Robert "BJ" Simpson, WFO Little Rock, AK;
and, Sean Clarke, WFO Little Rock, AK

(Photo courtesy of WFO Nashville)

Training and Outreach
GIS Day: Wednesday, November 17th

To help promote GIS Day, an updated NWS "Top News" template is being developed and will be shared with those offices that wish to display such information on their home page. This is a great way to educate the public on how the National Weather Service utilizes this important tool to enhance our products and services. An outreach brochure will also be made available via the "Top News" template. All of this information can be found via the CR GIS wiki page... https://collaborate.crh.noaa.gov/wiki/index.php/Central_Region_GIS_Team_Page

Please share your GIS Day activities, stories, and pictures with us for inclusion in our next GIS/Google newsletter! Please email your write-up to darrin.hansing@noaa.gov.

For additional GIS Day information and resources, please check out the GIS Day webpage at...http://www.gisday.com/. You can also find more info on their Facebook page...http://www.facebook.com/gisday.

NWS-wide Webinar: GIS Topics

The CR GIS team will be conducting a GIS webinar, open to all of NOAA, on Thursday, November 18th at 1 PM CST. If you are receiving this newsletter via email distribution then you will be receiving Go To Webinar details about how to access this webinar as well. For those that do not get this information, please contact Andy Foster for access information (andy.foster@noaa.gov).

The topics to be presented include:

- Open Layer Development
- ArcGIS 10 overview
- Storm Damage Project
- GIS projects Local Application Database
- NWS GISchat
- Project Demonstrations

Web Sites of Interest:

CR GIS Team Wiki:
https://collaborate.crh.noaa.gov/wiki/index.php/
Central_Region_GIS_Team_Page

NWS GIS Resource Page:
http://gis.crh.noaa.gov/cr_resource.php

Google Earth Wiki:
https://collaborate.crh.noaa.gov/wiki/index.php/
Google_Earth_Information

NWS KML Resource Pages:
http://intra.crh.noaa.gov/roc/
http://www.srh.noaa.gov/gis/kml/

CR GIS Support Team:

Kris Lander (CRH)
Wendy Pearson (CRH)
Andy Foster (SGF)

Team Members:
http://gis.crh.noaa.gov/charter1.php

Google Support Team:

Darrin Hansing (CR-ILX)	*Keith Stellman (SR-SHV)*
Andy Foster (CR-SGF)	*Tim Brice (SR-EPZ)*
Kris Lander (CRH)	*CoreyPieper (SRH)*
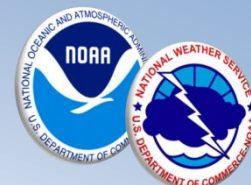
Article Submissions:

Please send article ideas, project write-ups, web links or any other information you would like included in the next edition of the newsletter to the editor at: darrin.hansing@noaa.gov